

Notice of Allowability

Application No.

10/698,104

Examiner

Quochien B. Vuong

Applicant(s)

HORNG, JYHCHAU

Art Unit

2685

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/31/2003.
2. ☒ The allowed claim(s) is/are 1-10.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 10/31/03, 05/26/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Reasons for Allowance

1. Claims 1-10 are allowed over the cited prior art.
2. The following is an examiner's statement of reasons for allowance:

Regarding independent claim 1, the Applicant's Admitted Prior Art (AAPA) discloses a method for increasing transmit diversity gain in a wireless communication system (figure 1) including a transmitter with 2^N transmit antennas, where N is greater than one, and a receiver antenna, comprising: generating, in the transmitter, a stream of pairs of symbols in a form X_1 and X_2 ; space-time transmit diversity encoding each pair of symbols at a symbol-level stage to produce a $2^1 \times 2^1$ matrix C as recited in the claim (see page 2, paragraphs [05]-[06]). However, the AAPA and the cited prior art fail to teach the method further comprising space-time transmit diversity coding pair of $2^1 \times 2^1$ matrices C of the previous state in a next state at a block level to produce a $2^2 \times 2^2$ output matrix T as recited in the claim and feeding transmit symbols of the output matrix T, in a left-to-right order, of each row, in a top-to-bottom order, to a corresponding different transmit antennas.

Regarding independent claim 9, the Applicant's Admitted Prior Art (AAPA) discloses a wireless transmitter (figure 1) including 2^N transmit antennas, where N is greater than one, comprising: means for generating a stream of pairs of symbols in a form X_1 and X_2 ; a space-time transmit diversity encoder configured to encode each pair of symbols at a symbol-level stage to produce a $2^1 \times 2^1$ matrix C as recited in the claim (see page 2, paragraphs [05]-[06]). However, the AAPA and the cited prior art fail to teach the transmitter further comprising a plurality of space-time transmit diversity

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coders, connected serially, configured to encode each pair of $2^{n-1} \times 2^{n-1}$ matrices of the previous state in a next state n at a block level to produce a $2^n \times 2^n$ output matrix; and means for feeding transmit symbols of the output matrix of last stage of the plurality of encoders, in a left-to-right order, of each row, in a top-to-bottom order, to a corresponding different one of 2^N transmit antennas.

Regarding independent claim 10, the Applicant's Admitted Prior Art (AAPA) discloses a wireless transmitter (figure 1), comprising: 2^N transmit antennas, where N is greater than one; means for generating a stream of pairs of symbols; one symbol level space-time transmit diversity encoder generating a first output matrix from each pair of symbols in the stream (see page 2, paragraphs [05]-[06]). However, the AAPA and the cited prior art fail to teach the transmitter further comprising $N-1$ block level space-time transmit diversity coders connected serially to each other and a first one of the block level space-time transmit diversity encoders is connected to the one symbol level space-time transmit diversity encoder, each block level space-time transmit diversity encoder generating a subsequent output matrix from pairs of output matrices of a previous encoder; and wherein a last encoder generates a $2^N \times 2^N$ output matrix; and feeding transmit symbols of the output matrix of last output matrix, in a left-to-right order, of each of N rows, in a top-to-bottom order, to a corresponding different one of 2^N transmit antennas.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on 10/31/2003 and 05/26/2004 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Calderbank et al. (US 6,088,408) disclose decoding for generalized orthogonal designs for space-time codes for wireless communication.

Hammons, Jr. et al. (US 6,560,295) disclose method of generating space-time codes for generalized layered space-time architectures.

Wallace et al. (US 6,862,434) disclose transmission diversity system.

Al-Dhahir et al. (US 6,959,047) disclose training-based channel estimation for multiple-antennas.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quochien B. Vuong whose telephone number is (571) 272-7902. The examiner can normally be reached on M-F 9:30-18:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Quochien B. Vuong
Feb. 04, 2006.

QUOCHIE B. VUONG
PRIMARY EXAMINER